

A REVISION OF THE NEW TRIBE BRULLEIINI
(HYMENOPTERA : BRACONIDAE)

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Abstract

A new tribe is erected for the genera *Brulleia* Szépligeti, 1904 and *Parabrulleia*, n. gen. (Braconidae, Helconinae). Five new species are described; *Brulleia euphemia* Turner, 1919 is synonymized with *Parabrulleia shibuensis* (Matsumura 1912), n. comb.; *Cenocoelius annulicornis* Cameron, 1911 is synonymized with *Brulleia melanocephala* Szépligeti, 1904, and *Brulleia latianulata* (Cameron 1911) is a new combination in the genus *Brulleia*. The species are keyed, described and illustrated and their phylogeny is discussed.

INTRODUCTION

The isolated genus *Brulleia* Szépligeti has long consisted of two valid species: the type-species from New Guinea (*B. melanocephala* Szépligeti, 1904) and *Doryctes shibuensis* Matsumura, 1912 from Japan, China and Vietnam. Examination of the holotype of *B. melanocephala* showed that the maxillary and labial palpi both consist of two segments; however, in East Palearctic spp. the palpi are far less reduced. Further examination of the available material (including 5 new species) proved that the palpi do not provide reliable characters for generic division; the New Guinea species is at one end of a continuum and the Palearctic species at the other end. Nevertheless, one species proved to be sufficiently different to warrant the erection of a new genus. Both *Brulleia* Szépligeti and *Parabrulleia*, n. gen., are placed in the new tribe Brulleiini because they do not fit in the Helconini or in the Diospilini. The Brulleiini differ from the Helconini by the absence of vein 1-SR fore wing, the lack of a longitudinal lamella on the fronts, and the ventrally smooth hind femur. The Diospilini differ by the antefurcal vein m-cu of fore wing, the shorter fore tarsus and hind trochanter, the wide apex of the fore wing and the (sub)vertical vein cu-a of hind wing. For a further analysis, see Fig. 1A.

The hosts of the Brulleiini are largely unknown; there is one record of larvae of Cerambycidae (Coleoptera) as host of *Parabrulleia shibuensis* (Matsumura) comb. nov. For technical terms used, see Van Achterberg (1979).

PHYLOGENY

The phylogenetic relationships of the species of the Brulleiini are far from easy to understand; only one species, *shibuensis*, clearly deviated from the rest. The seven known species of *Brulleia* occur from Japan to New Guinea and are closely related, despite striking differences. In Table 1 the few apomorphous character states are depicted and in Fig. 1B the most likely relationships are given. Certain character states are considered to be apomorphous as the result of out-group comparison, mainly with the Helconini and Diospilini. If the interpretation as given in Fig. 1B is correct, then Japan was colonized from the main land, and the Philippines via Japan. Both Java and



Fig. 1A. Cladogram depicting the possible relationships of the tribes of the Helconinae.

Table 1. Presence or absence of apomorphous character-states in the species of the tribe Brulleiini

Species	<i>shibuensis</i>	<i>nipponensis</i>	<i>townesi</i>	<i>brunneus</i>	<i>nigra</i>	<i>tricolor</i>	<i>melanocephala</i>	<i>latiannulata</i>	
○ Plesiomorphous character-state									● Apomorphous character-state
Hind tibia shorter than twice hind femur	●	○	○	○	○	○	○	○	Hind tibia longer than twice hind femur
Occipital carina arched dorsally	●	○	○	○	○	○	○	○	Occipital carina rounded dorsally
Clypeus more or less convex	●	○	○	◐	◐	●	◐	◐	Clypeus flat
Prepectal carina complete	○	○	●	●	●	○	●	●	Prepectal carina reduced
Notauli wide posteriorly	○	○	○	○	○	◐	●	●	Notauli narrow posteriorly
Maxillary palp with 6 segments	◐	◐	◐	◐	◐	◐	●	●	Maxillary palp segments reduced (◐ = 3-5, ● = 2)
Labial palp with 4 segments	◐	◐	◐	◐	◐	●	●	●	Labial palp segments reduced (◐ = 3, ● = 2)
Distribution	Japan & Cont. Asia	Japan	Philipp.	Indonesia		Philipp.	New Guinea		

New Guinea were colonized from the Philippines. Additionally it can be assumed that intermediate species remain to be discovered in Borneo, Celebes and the Moluccas.

BRULLEIINI, new tribe

Diagnosis: Length of fore wing 9.7–19.0 mm, of body 11.7–24 mm; antennal segments 33–44; antenna with no apical spine; annellus more or less differentiated (Figs. 59, 71, 85); labrum broadly truncate (Figs. 40, 65) or emarginate (Fig. 56); anterior tentorial pits large and deep (Figs. 6, 9); frons slightly concave (almost flat; Fig. 52) to distinctly concave (Figs. 6, 9), with no medio-longitudinal lamella; maxillary and labial palpi with 2–5 and 2–3 segments, respectively; face beside antennal sockets depressed (Figs. 6, 40); occipital carina bent towards hypostomal carina, joined distinctly above base of mandible (Fig. 20); malar suture (virtually) absent; mandible slightly twisted; pronope deep (Figs. 13, 23, 33); mesoscutum setose and finely punctate; scutellum with (rather) widely crenulated band posteriorly (Figs. 23, 34, 85); metapleural flange medium-sized (Fig. 2) to virtually absent (Fig. 35); propodeal spiracle round to slightly elliptical, distinctly in front of middle of propodeum (Fig. 2); propodeum with at most a short medial carina anteriorly (Fig. 69), with no areola or transverse carina and posterior part not differentiated from anterior part; vein 1-SR of fore wing and vein 2A of hind wing absent (Fig. 3); veins r-m, 2A and a of fore wing present (Fig. 17); veins cu-a of both fore and hind wing strongly inclivous (Figs. 50, 87); vein m-cu of fore wing postfurcal (Fig. 26); marginal cell of hind wing more or less widened (Figs. 3, 26); basal and 1st subdiscal cells of fore wing (largely) glabrous (Fig. 92); fore wing with (rather) slender apex (Figs. 3, 61, 79); vein a of fore wing is distinctly removed from vein cu-a (Figs. 3, 17); length of hind tibia 1.6–2.4 times hind femur; hind femur smooth ventrally; fore spur rather specialized (Fig. 80), its length 0.2–0.3 times fore basitarsus (Fig. 11); tarsal claws slender, simple (Figs. 7, 34, 58); fore tarsus very long, 1.7–2.0 times fore tibia; inner and outer hind spurs (sub)equal, their length 0.15–0.25 times hind basitarsus; metasoma inserted just between hind coxae (Fig. 35) or somewhat above coxae (Fig. 15); dorsope absent (Fig. 11); laterope large, and more or less elliptical (Figs. 2, 35, 59); ovipositor with subapical notch (Fig. 41); length of ovipositor sheaths 1.24–1.91 times fore wing.

Contains two genera: *Parabrulleia*, n. gen. and *Brulleia* Szépligeti, 1904.

Parabrulleia shibuensis (Matsumura), is a parasite of the larvae of Cerambycidae (Coleoptera).

KEY TO SPECIES OF THE TRIBE BRULLEIINI

1. Mandibles angularly bent medially (Fig. 6); 2nd tergite (at least superficially) sculptured basally (Fig. 12); 1st tergite extensively sculptured posteriorly (Fig. 12); length of ovipositor sheath 1.60–1.91 times fore wing; occipital carina evenly curved dorsally (Fig. 9); length of hind tibia 2.3–2.4 times hind femur; clypeus (including margin) flattened (Fig. 6); (*Parabrulleia*, n. gen.)
 1. *shibuensis* (Matsumura), n. comb.

The nominate subspecies (with hind tarsus yellowish-white or brownish-yellow) occurs in Vietnam and Japan. The subspecies (Turner) (with blackish hind tarsus) occurs in North China.

- Mandibles evenly curved (Figs. 22, 31, 65); 2nd tergite smooth; apex of 1st tergite (partly) smooth (Figs. 53, 70); length of ovipositor sheath 1.24 - 1.58 (exceptionally 1.79) times fore wing; occipital carina arched medio-dorsally (Figs. 21, 52) or reduced (Fig. 90); length of hind tibia 1.6 - 1.9 times hind femur; clypeus more or less convex or margin protruding; (*Brulleia Szépligeti*) 2
2. Labial palp with 3 segments (Figs. 20, 36); maxillary palp with 4 or 5 segments (Figs. 20, 25, 54); marginal cell of hind wing narrower apically, its apical width 2.3 - 3.0 (exceptionally 4.0) times the minimum width of cell below vein R1 (Figs. 17, 50); notauli comparatively wide and distinct subposteriorly (Figs. 23, 55) 3
- Labial palp with 2 segments (Figs. 62, 77); maxillary palp with 2 or 3 segments (Figs. 77, 89), exceptionally 4th segment faintly indicated basally (Fig. 62); marginal cell of hind wing rather wide apically, its apical width 3-4 times the minimum width of cell below vein R1 (Figs. 61, 87); notauli comparatively narrow subposteriorly (Fig. 69) or reduced (Fig. 82) 6
3. Maxillary palp with 5 segments (Fig. 20) and its length 0.5 - 0.7 times height of head (Fig. 15); prepectal carina complete (Fig. 15) 2. *nipponensis*, n. sp.
- Maxillary palp with 4 segments (Figs. 25, 36) and its length ca. 0.3 times height of head (Fig. 24); prepectal carina reduced anteriorly (Fig. 24) and medio-ventrally obsolescent or absent (Fig. 35) 4
4. Antenna with no whitish band; pronope short, scarcely wider than long (Fig. 33); dorsal half of antenna yellowish; 1st tergite robust, its length ca. 1.4 times its apical width (Fig. 29) 3. *townesi*, n. sp.
- Antenna with whitish band; pronope strongly transverse, much wider than long (Figs. 42, 55); basal half of antenna largely blackish; 1st tergite slender, its length 2.1 - 4.6 times its apical width (Figs. 46, 53) 5
5. Body completely brownish-yellow; basal half of vein 2A of fore wing not sclerotized (Fig. 37); bases of fore and middle tibiae yellowish; labrum subtruncate apically (Fig. 40) 4. *brunnea*, n. sp.
- Body almost completely black; basal half of vein 2A of fore wing sclerotized (Fig. 50); bases of fore and middle tibiae whitish; labrum deeply emarginate (Fig. 56) 5. *nigra*, n. sp.
6. Maxillary palp with 3 segments, 4th segment more or less faintly indicated (Fig. 62); prepectal carina complete and strong (Fig. 59); 1st tergite slender (Figs. 67, 70), its length 2.1 - 4.6 times its apical width; dorsal carinae of 1st tergite distinct basally (Fig. 70) . 6. *tricolor*, n. sp.
- Maxillary palp with 2 segments (Figs. 77, 89); prepectal carina reduced dorsally (Fig. 71) and weak (Fig. 84); 1st tergite usually rather robust (Figs. 83, 98), its length about 1.8 (exceptionally about 3) times its apical width; dorsal carinae of 1st tergite reduced basally (Figs. 83) or absent (Fig. 89) 7

7. Body (except head) brownish-yellow, without metallic sheen; base of hind tibia and whole hind tarsus yellowish or brownish; clypeus flat medially or nearly so (Fig. 73); 15th and 16th antennal segments dark brown or black 7. *melanocephala* Szépligeti
 Body largely black with a bluish metallic sheen; base of hind tibia and hind tarsus (except telotarsus) white; clypeus medially distinctly depressed (Fig. 91); 1st and 16th antennal segments white
 8. *latiannulata* (Cameron), n. comb.

PARABRULLEIA, n. genus

Type-species: *Doryctes shibuensis* Matsumura, 1912.

Etymology: The word "para" (Greek for "near") is added to the name *Brulleia*, because of the new genus is closely related to the genus *Brulleia*.
Gender: feminine.

Mandibles angularly bent medially (Fig. 6); maxillary and labial palpi with 4 and 3 segments, respectively (Fig. 8); clypeus flat (Fig. 6); occipital carina evenly curved, not arched (Fig. 9); vertex without distinct medial groove; frons medially distinctly concave (Fig. 6); length of hind tibia 2.3 - 2.4 times hind femur; 2nd tergite sculptured basally (Fig. 12).

Distribution: East Palearctic and North East Oriental regions; one species.

1. *Parabrulleia shibuensis* (Matsumura), n. comb. (Figs. 2 - 14, 100)

Doryctes shibuensis Matsumura, 1912: 151, pl. 52-1.

Brulleia shibuensis: Shenefelt, 1970: 190; Watanabe, 1972: 7, Figs, 5, 6.

Brulleia chinensis Turner, 1918: 171; Shenefelt, 1970: 190.

Brulleia euphemia Turner, 1918: 387; Shenefelt, 1970: 190. Syn. nov.

Redescribed from the holotype of *Brulleia euphemia* Turner, female.

Length: Body 22 mm. Fore wing 17.1 mm.

Head: Antennal segments 33, but apical segments missing, length of 3rd segment 1.1 times 4th segment, length of 3rd and 4th segments 4.2 and 3.9 times their width, respectively; annellus scarcely differentiated (Fig. 10); length of maxillary palp 0.3 times height of head; length of eye in dorsal view 1.2 times temple; temple punctulate (Fig. 9); POL : \emptyset ocellus : OOL = 4 : 5 : 10; frons rugose, but punctulate near eyes (Fig. 9); face coarsely reticulate-rugose; clypeus shallowly punctate (Fig. 6); malar space coriaceous, its length 0.7 times basal width of mandible.

Mesosoma: Length of mesosoma 1.7 times its height; pronope very large, wide, spindle-shaped (Fig. 13); side of pronotum medially and posteriorly coarsely crenulate, ventrally punctulate, rest smooth (Fig. 2); prepectal carina rather weak and irregular, medio-ventrally absent; precoxal sulcus complete, punctate-rugose (Fig. 2); notauli deep, complete and widely crenulate (Fig. 13); scutellum rather flat and punctulate; propodeum coarsely reticulate, but antero-laterally coriaceous (Fig. 13).

Wings: Fore wing: $r : 3\text{-SR} : \text{SRI} = 9 : 12 : 45$; $1\text{-CUI} : 2\text{-CUI} = 3 : 32$; $2\text{-SR} : 3\text{-SR} : r\text{-m} = 9 : 12 : 12$. Hind wing: *cu-a* sinuate and strongly incivous (Fig. 3).

Legs: Length of femur, tibia and basitarsus of hind leg 5.1, 17.8, and 10.7 times their width, respectively; length of hind tibia 2.3 times hind femur (Fig. 14).

Metasoma: Length of 1st tergite 2.0 times its apical width, its surface coarsely reticulate medially, laterally and basally largely crenulate (Fig. 12), dorsal carinae present in front of spiracles; length of ovipositor sheath 1.91 times fore wing.

Color: Yellowish-brown; antenna (except two basal segments, annellus, and 10th-16th segments) and ovipositor sheath, black; fore wing anteriorly (including pterostigma) and apices of 3rd-8th tergites, 5th sternite and hypopygium partly, and middle of mesoscutal lobes, more or less dark brown; rest of wing veins brown; 10th-16th antennal segments and middle and hind tarsi, yellowish-white; wing membrane brown.

Holotype of *euphemia* in British Museum (Natural History), London: "Type, H. T.", "B. M. Type, Hym., 3.c.898", "Brulleia euphemia Turn., Type", "Tonkin, V. 1917, R. V. de Salvaza", "Indo-China, R. V. de Salvaza, 1919-25". Additionally examined: 1) Holotype of *Doryctes shibuensis* Matsumura from Japan (Entomological Institute, Sapporo; F); agrees with holotype of *euphemia*. but the hind tarsus is yellowish-brown. 2) Holotype of *Brulleia chinensis* from North China [British Museum (Natural History); M], hind tarsus and apical half of hind tibia, blackish; 1st tergite densely vermiculate and coarsely rugose; basal 0.7 of 2nd tergite largely and distinctly rugose; vein *r-m* of fore wing scarcely bent (Fig. 100); malar space rugose. 3) 4 F from Japan: Tokyo (Townes Collection, Ann Arbor; Entomological Institute, Sapporo), Odawara (Kanagawa Pref., Honshu), and Mt. Hiko (Fukuoka Pref., Kyushu). Both latter specimens in Kyushu University Collection, Fukuoka.

Variation: Antennal segments 41 (1 F); length penultimate segment ca. 1.4 times its width; length of fore wing 17.1-19.9 mm, of body 22-24.8 mm; length of ovipositor sheath 1.6-1.91 times fore wing; marginal cell of hind wing usually wider apically than figured; length of hind tibia 2.3-2.4 times hind femur.

Genus BRULLEIA Szépligeti

Type-species: *Brulleia melanocephala* Szépligeti, 1904.

Diagnosis: Mandibles evenly curved (Figs. 22, 31, 65); maxillary and labial palpi 2-5 and 2-3 segments, respectively (Figs. 20, 36, 62, 77); face densely reticulate-rugose; clypeus more or less convex or medially depressed (Figs. 22, 40, 56, 65); occipital carina arched medio-dorsally (Figs. 21, 30, 52) or reduced (Fig. 90); vertex usually with longitudinal groove (Figs. 21, 44); frons weakly concave medially (Figs. 64, 75, 90) or nearly flat (Figs. 44, 52); length of hind tibia 1.6-1.9 times hind femur; 2nd tergite smooth.

Distribution: East Palearctic, East Oriental and New Guinea; seven species.

M = male. F = Female.

2. *Brulleia nipponensis*, n. sp. (Figs. 15 - 23, 92 - 96)

Brulleia euphemia: Watanabe, 1972: 7 (nec Turner, 1919).

Length: Body 16.1 mm. Fore wing 12.4 mm.

Head: Antennal segments 41, length of 3rd segment 1.3 times 4th segment, length of 3rd and 4th segments 5.0 and 4.0 times their width, respectively, the penultimate segment quadrate (Fig. 18); maxillary and labial palpi with 5 and 3 segments, respectively (Fig. 20); length of maxillary palp 0.6 times height of head; length of eye in dorsal view 1.1 times temple; temple punctate (Fig. 21); POL : \emptyset ocellus : OOL = 6 : 5 : 13; frons largely curved striate (Fig. 21); clypeus coarsely punctate (Fig. 22); malar space rugose, its length 0.9 times basal width of mandible.

Mesosoma: Length of mesosoma 1.6 times its height; pronope medium-sized and slit-shaped (Fig. 23); side of pronotum rugose except for the punctulate dorsal part and the crenulate medial groove (Fig. 15); prepectal carina complete; precoxal sulcus complete, crenulate-rugose and area below it densely punctate (Fig. 15); notauli deep, widely crenulate posteriorly (Fig. 23); scutellum rather convex and densely punctate; propodeum reticulate-rugose, but antero-laterally punctate, rugae more widely spaced than in *shibuensis*.

Wings: Fore wing: r : 3-SR : SR1 = 7 : 11 : 43; 1-CU1 : 2-CU1 = 1 : 12; 2-SR : 3-SR : r-m = 11 : 11 : 14. Hind wing: cu-a inclivous and posteriorly curved towards wing base (Fig. 17).

Legs: Length of femur, tibia and basitarsus of hind leg 5.8, 11.2 and 9.4 times their width, respectively; length of hind tibia 1.6 times hind femur (Fig. 95).

Metasoma: Length of 1st tergite 1.8 times its apical width, its surface rather sparsely rugose and posteriorly smooth (Fig. 96); dorsal carinae present in front of spiracles; length of ovipositor sheath 1.41 times fore wing.

Color: Brownish-yellow; mandibles, pterostigma (but basally and apically narrowly yellowish), wing veins, antenna (but 1st and 2nd segments brownish-yellow and 10th-14th segments yellowish-white), and ovipositor sheath, dark brown or blackish; apex of hind tibia slightly infuscated; wing membrane yellowish.

Holotype: Female, Fukuoka: Mt. Kanayama, Fukuoka Pref. (Kyushu, Japan), 11. viii. 1979, R. Noda leg. Type no. 2229. (Entomological Laboratory, Kyushu University). *Paratype*: 1 F, Hirakura, Mie Honshu, 17. viii. 1958, M. Matsuura (Rijksmuseum van Natuurlijke Historie, Leiden). 1 F, Sata, Kagoshima, 24. iv. 1964, Y. Miyake. 1 F, Zyozankei, Hokkaido, 17. ix. 1954, T. Kumata (Entomological Institute, Sapporo).

Variation: Length of fore wing 10.1-13.5 mm, of body 12.2-18.2 mm; length of maxillar palp 0.5-0.7 times height of head; length of ovipositor sheath 1.41-1.56 times fore wing.

3. *Brulleia townesi*, n. sp. (Figs. 24 - 34)

Length: 11.7 mm, fore wing 9.7 mm.

Head: Antennal segments 41, length of 3rd segment 1.3 times 4th segment, length of 3rd and 4th segments 3.5 and 2.8 times their width, respectively,

length of penultimate segment 0.9 times its width (Fig. 27); maxillary and labial palpi with 4 and 3 segments, respectively (Fig. 25); length of maxillary palp 0.3 times height of head; length of eye in dorsal view 1.5 times temple; temple punctate (Fig. 24); POL : \emptyset ocellus : OOL = 9 : 7 : 23; frons medially largely smooth, laterally striate (Fig. 30); clypeus punctate (Fig. 31); malar space rugose, its length 0.8 times basal width of mandible.

Mesosoma: Length of mesosoma 1.5 times its height; pronope large and transverse (Fig. 33); side of pronotum ventrally largely smooth, medially crenulate, rest partly rugose-crenulate (Fig. 24); prepectal carina laterally reduced, weak and medio-ventrally absent; precoxal sulcus complete, reticulate-rugose (Fig. 24); notauli rather deep and narrowly crenulate, but posteriorly wider (Fig. 33); scutellum convex, densely and finely punctate (Fig. 33); propodeum medially transversely rugose, laterally finer rugose.

Wings: Fore wing: r : 3-SR : SR1 = 7 : 11 : 40; cu-a subinterstitial; 2-SR : 3-SR : r-m = 10 : 11 : 10. Hind wing: cu-a inclivous and only slightly bent posteriorly (Fig. 26).

Legs: Length of femur, tibia and basitarsus of hind leg 4.6, 12.3, and 10.4 times its width, respectively; length of hind tibia 1.7 times hind femur (Fig. 32).

Metasoma: Length of 1st tergite 1.4 times its apical width, its surface medially smooth, laterally rugose (Fig. 29); dorsal carinae weak in front of spiracles; length of ovipositor sheath 1.58 times fore wing.

Color: Brownish-yellow; basal 17 segments of antenna whitish-yellow, rest dark brown; pterostigma, wing veins and ovipositor sheath, dark brown; side of mesosoma, stemmaticum and apex of 1st tergite with faint infuscated patches; wing membrane light brown; legs (including hind tarsus) light yellowish.

Holotype: Female, Philippines: Mindoro, Alcate, Victoria, iv. 11. 1954, H., M. & D. Townes (Townes).

4. **Brulleia brunnea**, n. sp. (Figs. 35-46)

Length: Body 12.2-13.1 mm. Fore wing 11.1 mm.

Head: Antennal segments 43-44, length of 3rd segment 1.2 times 4th segment, length of 3rd and 4th segments 4.2 and 3.6 times their width, respectively; the penultimate segment quadrate (Fig. 38); maxillary and labial palpi with 4 and 3 segments, respectively (Fig. 36); length of maxillary palp 0.3 times height of head; length of eye in dorsal view 1.3 times temple; temple finely punctate (Fig. 35); POL : \emptyset ocellus : OOL = 9 : 7 : 18; frons rugose (Fig. 44); clypeus rugose (Fig. 40); labrum truncate ventrally (Fig. 40); malar space rugose, its length 0.9 times basal width of mandible.

Mesosoma: Length of mesosoma 1.5 times its height; pronope very wide, slit-shaped and deep (Fig. 42); side of pronotum largely smooth, but medio-anteriorly crenulate and rugose-punctate ventrally (Fig. 35); prepectal carina only laterally largely present (Fig. 35); precoxal sulcus complete, strongly rugose; notauli complete, posteriorly widely rugose-crenulate (Fig. 42);

scutellum rather flat, densely and finely punctate; propodeum coarsely reticulate-rugose, except anterolaterally.

Wings: Fore wing: $r : 3\text{-SR} : \text{SR1} = 7 : 15 : 4$; $1\text{-CUI} : 2\text{-CUI} = 3 : 3$; $2\text{-SR} : 3\text{-SR} : r\text{-m} = 19 : 30 : 20$; 2A largely unsclerotized. Hind wing: cu-a inclivous, somewhat sinuate (Fig. 37).

Legs: Length of femur, tibia and basitarsus of hind leg 6.4, 15.2 and 10.8 times its width, respectively; length of hind tibia 1.8 times hind femur (Fig. 45).

Metasoma: Length of 1st tergite 2.1-2.4 times its apical width, its surface rather coarsely reticulate-rugose, but basally and apically narrowly smooth (Fig. 46), dorsal carinae obsolete in front of spiracles; length of ovipositor sheath 1.46-1.54 times fore wing.

Color: Brownish-yellow; hind tarsus (except base), and 11th (except base) 19th (except apex) antennal segments, white; rest of antenna (except scapus, pedicellus and radix), vein C+SC+R (except base), pterostigma, and ovipositor sheath, black or blackish-brown; rest of wing veins dark brown; wing membrane light brown; humeral plate whitish; apex of hind tibia slightly infuscated.

Holotype and paratype: Female, Java: G. Tangkoeban Prahoe, 4000-5000 ft., Preanger, III. 1938. *Paratype*: 1 F, topotypic, v. 1937, F. C. Drescher (Rijksmuseum, Leiden).

5. *Brulleia nigra*, n. sp. (Figs. 47-58)

Length: Body 14.6 mm. Fore wing 11.7 mm.

Head: Antennal segments 44, length of 3rd segment 1.2 times 4th segment, length of 3rd and 4th segments 4.1 and 3.4 times their width, respectively, length of penultimate segment 0.9 times its width (Fig. 49); maxillary and labial palpi with 4 and 3 segments, respectively (Fig. 54); length of maxillary palp 0.3 times height of head; length of eye in dorsal view 1.4 times temple; temple finely rugose, laterally striate (Fig. 52); clypeus rugose (Fig. 56); labrum emarginate ventrally (Fig. 56); malar space rugose, its length 0.7 times basal width of mandible.

Mesosoma: Length of mesosoma 1.6 times its height; pronope very wide, deep and, elliptical (Fig. 55); side of pronotum medio-dorsally crenulate, ventrally striate, posteriorly punctate, and rest smooth (Fig. 47); prepectal carina laterally weak and ventrally absent (Fig. 47); precoxal sulcus complete and rugose (Fig. 47); notauli complete and posteriorly widely crenulate (Fig. 55); scutellum rather convex and sparsely punctulate (Fig. 55); propodeum largely reticulate-rugose and antero-laterally smooth.

Wings: Fore wing: $r : 3\text{-SR} : \text{SR1} = 13 : 26 : 38$; $1\text{-CUI} : 2\text{-CUI} = 1 : 10$; $2\text{-SR} : 3\text{-SR} : r\text{-m} = 19 : 26 : 14$; 2A distinctly sclerotized basally. Hind wing: cu-a inclivous, somewhat bent posteriorly (Fig. 50).

Legs: Length of femur, tibia and basitarsus of hind leg 6.7, 13.7, and 11.0 times their width, respectively; length of hind tibia 1.8 times hind femur (Fig. 57).

Metasoma: Length of 1st tergite 2.1 times its apical width, its surface rugose, but basally and apically smooth (Fig. 53), dorsal carinae absent; length of ovipositor sheath 1.44 times fore wing.

Color: Black; Radix, scapus, pedicellus, and annellus of antenna, fore leg (except basal 0.7 of fore tibia), middle coxa, metasoma ventro-basally, apex of 3rd tergite, 8th tergite, wing veins largely, pterostigma, and humeral plate, (dark) brown; hind tarsus (except base), 11th-16th antennal segments, white; palpi, yellowish; basal 0.7 of fore tibia, basal 0.3 of middle tibia, 4th and 5th middle tarsal segments, whitish; rest of middle leg, hind coxa and trochanters; blackish-brown.

Holotype: Female, Java: Tjibodas, 1400 m, 27-29. vii. 1930, Lieftinck (Rijksmuseum van Natuurlijke Historie, Leiden).

6. *Brulleia tricolor*, n. sp. (Figs. 59-70)

Length: Body 11.8 mm. Fore wing 10.5 mm.

Head: Antennal segments 40, length of 3rd segment 1.2 times 4th segment, length of 3rd and 4th segments 4.7 and 4.0 times their width, respectively, length of penultimate segment 1.2 times its width (Fig. 60); annellus differentiated (Fig. 59); maxillary and labial palpi with 3, (but 4th faintly indicated) and 2 segments, respectively (Fig. 62); length of maxillary palp 0.2 times height of head; length of eye in dorsal view 1.3 times temple; temple punctulate (Fig. 59); POL : \emptyset ocellus : OOL = 7 : 4 : 12; frons largely smooth medially, laterally striate (Fig. 64); clypeus rugose (Fig. 65); malar space rugose, its length 0.7 times basal width of mandible.

Mesosoma: Length of mesosoma 1.5 times its height; pronope wide, deep and spindle-shaped (Fig. 69) side of pronotum medially crenulate, rest largely smooth (Fig. 59); prepectal carina complete and lamelliform (Fig. 59). Precoxal sulcus complete and rugose; notauli complete, narrowly crenulate posteriorly (Fig. 69); suctellum rather convex and punctulate. Propodeum reticulate, but anteriorly largely smooth and with short medial carina (Fig. 69).

Wings: Fore wing: r : 3-SR : SR1 = 2 : 3 : 10; 1-CU1 : 2-CU1 = 2 : 17; 2-SR : 3-SR : r-m = 11 : 12 : 10. Hind wing: cu-a inclivous and distinctly sinuate (Fig. 65).

Legs: Length of femur, tibia and basitarsus of hind leg of F-paratype (missing in holotype) 5.9, 15.7, and 11.6 times its width, respectively; length of hind tibia 1.8 times hind femur (Fig. 66).

Metasoma: Length of 1st tergite 2.3 times its apical width, its surface behind spiracles finely reticulate-rugose, but medially, posteriorly and in front of spiracles smooth (Fig. 70); dorsal carinae present in basal 0.6 of 1st tergite; length of ovipositor sheath 1.54 times fore wing.

Color: Black; coxae, trochanters, femora, metanotum, propodeum, 1st and 2nd tergites, reddish-brown; base of femora, middle basitarsus [and hind tarsus (except for brownish telotarsus) of paratypes], and 10th-17th antennal segments, white; fore tarsus, rest of middle tarsus and wings, infuscated; scapus, pedicellus, apical 0.7 of fore and middle tibiae and pterostigma, dark brown.

Holotype: Female, Philippines: Mt. Canlaon, 3600 ft., Negros Or., May 8, 1953, H., M. & D. Townes (Townes). *Paratypes*: 1 F and 3 M, # 1 F, topotypic (Rijksmuseum van Natuurlijke Historie, Leiden). 2 M, topotypic, April 29, 1953 and May 8, 1953, (Townes) Collection. 1 M, Illong, Mt. Halcon, 4500 ft., Mdro. Or., v. 11. '54, Phil., M. & D. Townes (Townes).

Variation: Length of fore wing 10.5–10.6 mm (F) or 6.8–9.5 mm (M), of body 11.8–12.8 mm (F) or 9.0–13.5 mm (M); antennal segments of M 35–38; length of 1st tergite 2.1–2.3 times its apical width (F) or 3.7–4.6 times (M, Fig. 67); M-paratypes have only 11th–13th antennal segments white, hind basitarsus brown or white basally, 4th maxillary palp segment in 1 M almost completely differentiated, and mesosoma (except for 1st tergite) brown.

7. *Brulleia melanocephala* Szépligeti (Figs. 71–83)

Brulleia melanocephala Szépligeti, 1904: 150, Fig. 32; Shenefelt, 1970: 190.

Cenocoelius annulicornis Cameron, 1911: 245–247; Shenefelt, 1970: 180;
Van Achterberg, 1980: 210. n. syn.

Length: Body 14.8 mm. Fore wing 11.5 mm.

Head: Antennal segments 41, length of 3rd segment 1.1 times 4th segment, length of 3rd and 4th segments 4.8 and 4.4 times their width, respectively, length of penultimate segment 1.2 times its width (Fig. 72); annellus distinct (Fig. 76); maxillary and labial palpi both with 2 segments (Fig. 77); maxillary palp not or slightly protruding below head (Fig. 71); eye in dorsal view 1.6 times temple; temple smooth (Fig. 71); POL : Ø ocellus : OOL = 11 : 9 : 24; frons with some stria, largely smooth (Fig. 75); clypeus coarsely reticulate (Fig. 73); malar space rugose, its length 0.9 times basal width of mandible.

Mesosoma: Length of mesosoma 1.5 times its height; pronope spindle-shaped, deep and wide; side of pronotum smooth, but medio-anteriorly and posteriorly crenulate (Fig. 71); prepectal carina absent laterally (Fig. 71), ventrally present; only posterior half of precoxal sulcus rugose, rest largely smooth and shallow (Fig. 71); notauli complete, largely smooth, and narrow posteriorly (Fig. 82); scutellum convex and punctulate; propodeum coarsely reticulate-rugose, with a short medial carina anteriorly.

Wings: Fore wing: $r : 3-SR : SR1 = 10 : 18 : 55$; $1-Cu1 : 2-Cu1 = 3 : 22$; $2-SR : 3-SR : r-m = 13 : 18 : 16$. Hind wing: cu-a inclivous and rather curved (Fig. 79).

Legs: Length of femur, tibia and basitarsus of hind leg 4.9, 13.6, and 13.2 times their width, respectively; length of hind tibia 1.8 times hind femur (Fig. 78).

Metasoma: Length of 1st tergite 1.8 times its apical width, its surface largely smooth, except for some rugae behind spiracles (Fig. 83); length of ovipositor sheath 1.39 times fore wing.

Holotype in Budapest Museum: New Guinea: Biro, iv. 4. 1901, Mt. Hansemann, Astrolabe B., 1 F (Holotype), "*Brulleia melanocephala* Szépl., 1904, det. Papp., 1967", "Hym. Typ. No. 782, Mus. Budapest". Holotype of *Cenocoelius annulicornis* Cameron (Instituut voor Taxonomische Zoologie, Amsterdam): New Guinea: Lorentz, 1909–10, Bivak Eiland, ix. 09, "*Cenocoelius annulicornis* Cam., Type" (in Cameron's handwriting). Further 1 F examined (Townes Collection, Ann Arbor): Baiyer R., (Papua) N. Guinea, II. 6–25. 1979, 1100 m, J. Sedlacek.

Variation: Length of fore wing 11.3–12.4 mm, of body 14.0–15.5 mm; antennal segments 41–43; length of ovipositor sheath 1.24–1.51 times fore wing; the holotype of *annulicornis* has posterior half of 1st tergite extensively

sculptured; wing membrane infuscated, and precoxal sulcus completely sculptured; the F from Papua New Guinea has scapus and pedicellus dark brown or blackish and only 11th-13th antennal segments whitish.

8. *Brulleia latiannulata* (Cameron), n. comb. (Fig. 84-91, 97-99, 101)

Cenocoelius latiannulatus Cameron, 1911: 236; Shenefelt, 1970: 181; Van Achterberg, 1980: 211.

Length: Body 17.5 mm. Fore wing 13.0 mm.

Head: Remaining antennal segments 21, apical segments missing, length of 3rd segment 1.2 times 4th segment, length of 3rd and 4th segments 5.2 and 4.2 times their width, respectively; annellus distinct (Fig. 85); maxillary and labial palpi both with 2 segments (Fig. 89); maxillary palp slightly protruding below head (Fig. 84); eye in dorsal view 1.1 times temple; temple largely smooth (Fig. 84); occipital carina reduced medio-dorsally (Fig. 90); POL : \emptyset ocellus : 00L = 12 : 6 : 6; frons with some striae (Fig. 90); clypeus reticulate-rugose (Fig. 91); malar space rugose, its length 0.8 times basal width of mandible.

Mesosoma: Length of mesosoma 1.5 times its height; pronope, spindle-shaped, deep and large; side of pronotum medially smooth, rest crenulate or rugulose (Fig. 84); prepectal carina nearly complete, weak behind fore coxae; precoxal sulcus complete, coarsely rugose; notauli complete, posteriorly narrowly crenulate (Fig. 101); scutellum convex and punctulate; propodeum coarsely reticulate, but anteriorly smooth.

Wings: Fore wing: r : 3-SR : SR1 = 8 : 12 : 40; 1-CU1 : 2-CU1 = 5 : 32; 2-SR : 3-SR : r-m = 10 : 12 : 12. Hind wing: cu-a inclivous and sinuate (Fig. 87).

Legs: Length of femur, tibia and basitarsus of hind leg 5.1, 14.3 and 13.2 times their width, respectively; length of hind tibia 1.9 times hind femur (Fig. 97).

Metasoma: Length of 1st tergite 1.8 times its apical width, its surface behind spiracles coarsely reticulate-rugose (Fig. 98), dorsal carinae absent; length of ovipositor sheath 1.79 times fore wing.

Color: Black with a bluish metallic sheen; 10th-16th antennal segments, basal third of hind tibia, hind tarsus, trochanters (largely), middle tibia (except apex), fore tibia, more or less whitish; scapus, pedicellus, annellus, palpi, mandibles, pterostigma, wing veins, tegulae, more or less dark brown; fore tarsus, fore femur dorsally, and middle tarsus (except basitarsus), brownish; epipleuron of 1st tergite, apical part of 2nd and basal margin of 3rd epipleura, whitish-yellow; wing membrane rather infuscated, more strongly near veins r and 3-SR, and pterostigma of fore wing (Fig. 86).

Holotype in Instituut voor Taxonomische Zoologie, Amsterdam: New Guinea: Lorentz, 1909-10, Bivak Eiland, I. 10, "Cenocoelius latiannulatus Cam., Type" (in Cameron's handwriting). Additionally examined 4 F (3 in Townes Collection, Ann Arbor; 1 in Rijksmuseum van Natuurlijke Historie, Leiden) from Papua New Guinea. Collected in Saruwaged Mountains (500 m, I. 22-II. 16. 1979), Laea Zdnag Road (200 m, I. 14-19. 1979), Busu River, 60 km East of Lae, 20 m, I. 13-III. 10. 1979), and Gerit River (650 m, Jimmi Valley, II. 7-26. 1979).

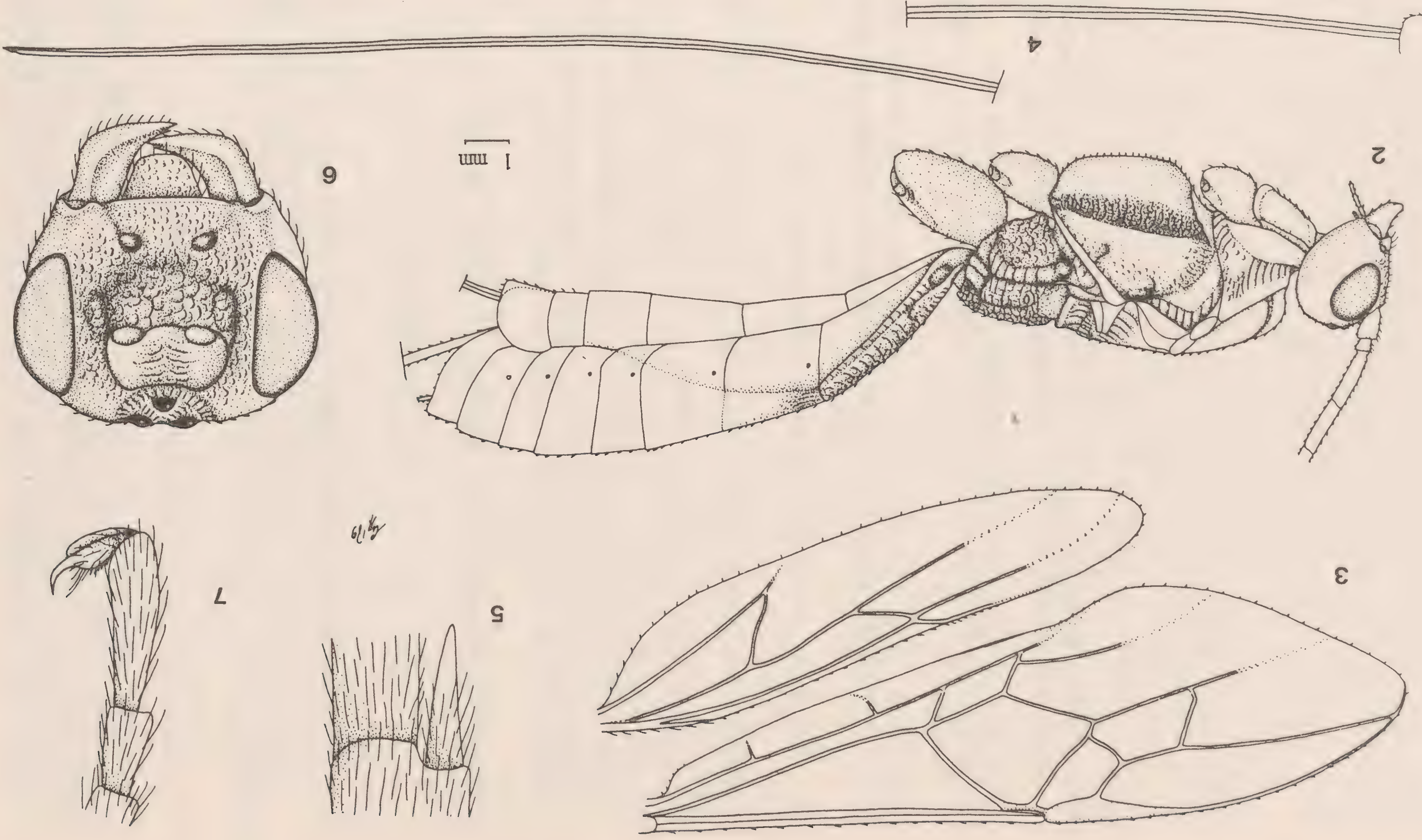
Variation: Length of fore wing 7.3–13.0 mm, of body 9.0–17.5 mm; antennal segments 39–41; length of 1st tergite 1.8–3.1 times its apical width, surface sometimes largely smooth; length of ovipositor sheath 1.56–1.79 times fore wing; scapus blackish or dark brown; occipital carina obsolete and arched dorsally or medially absent.

ACKNOWLEDGMENTS

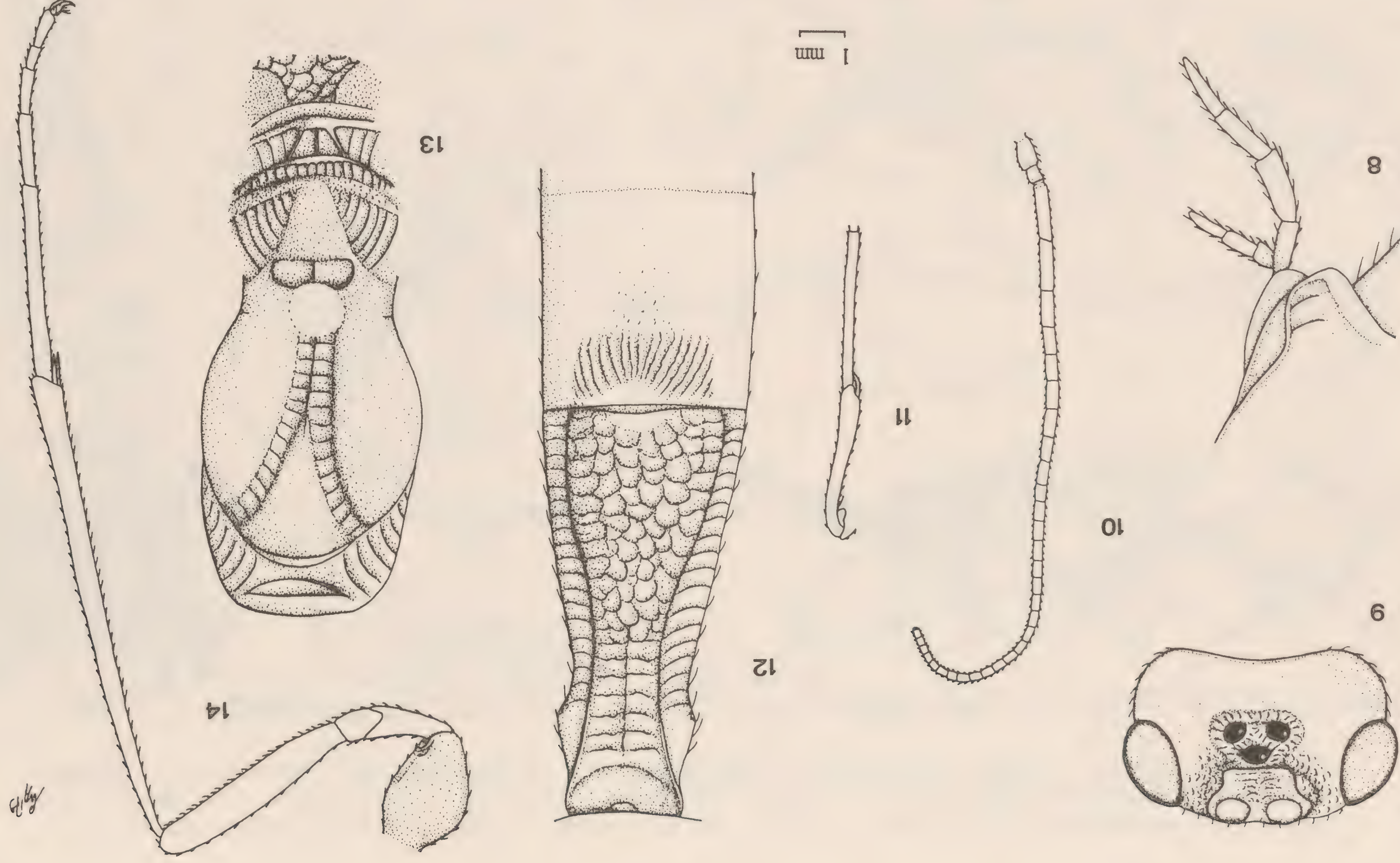
I wish to express my gratitude to the following persons for providing type-specimens, unidentified specimens, or valuable comment: Mr. T. Huddleston (London); Mr. K. Maeto (Fukuoka); Dr. P. Oosterbroek (Amsterdam); Dr. J. Papp (Budapest); Drs. M. Suwa and C. Watanabe (Sapporo); and Drs. H. K. and M. Townes (Ann Arbor).

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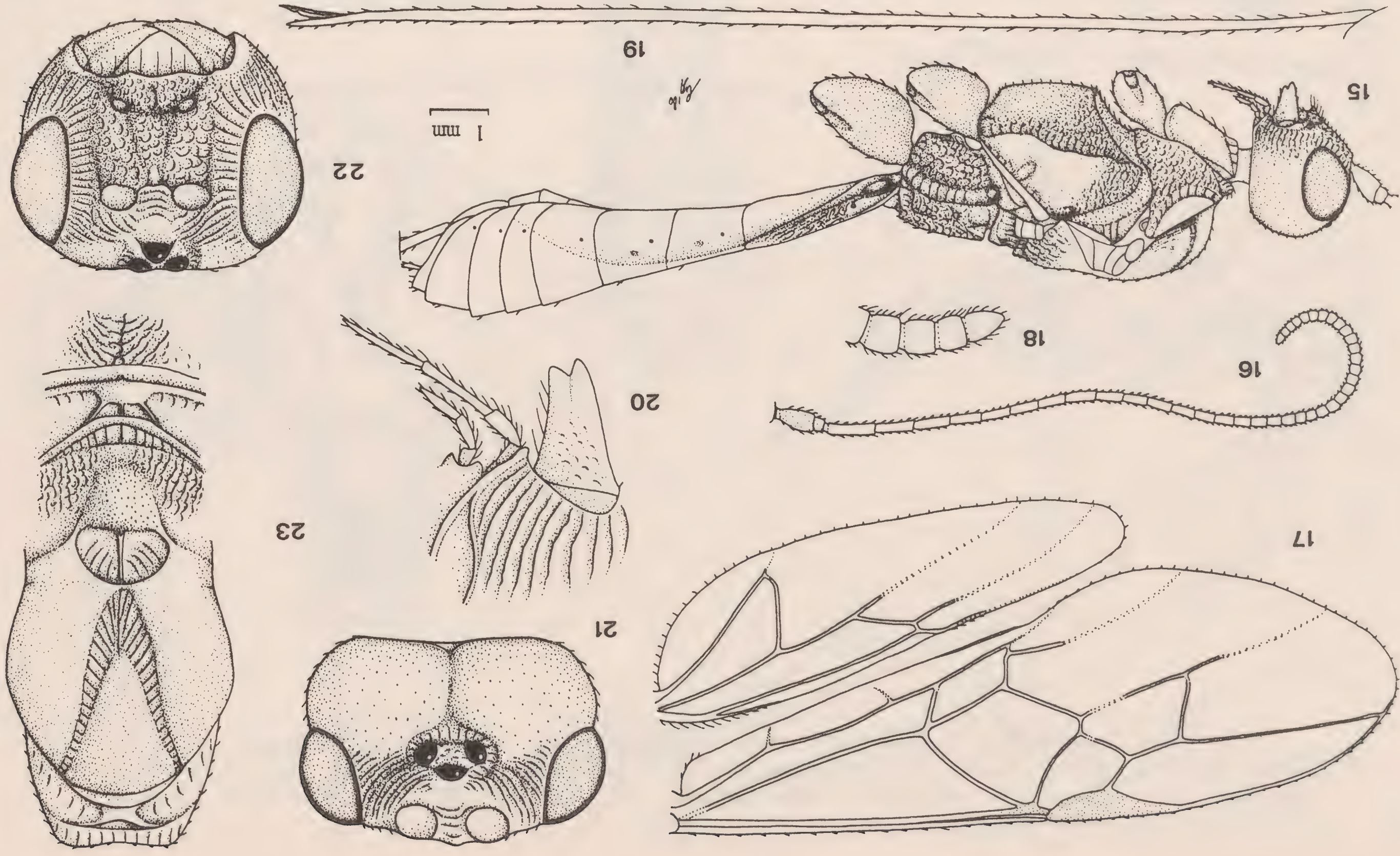
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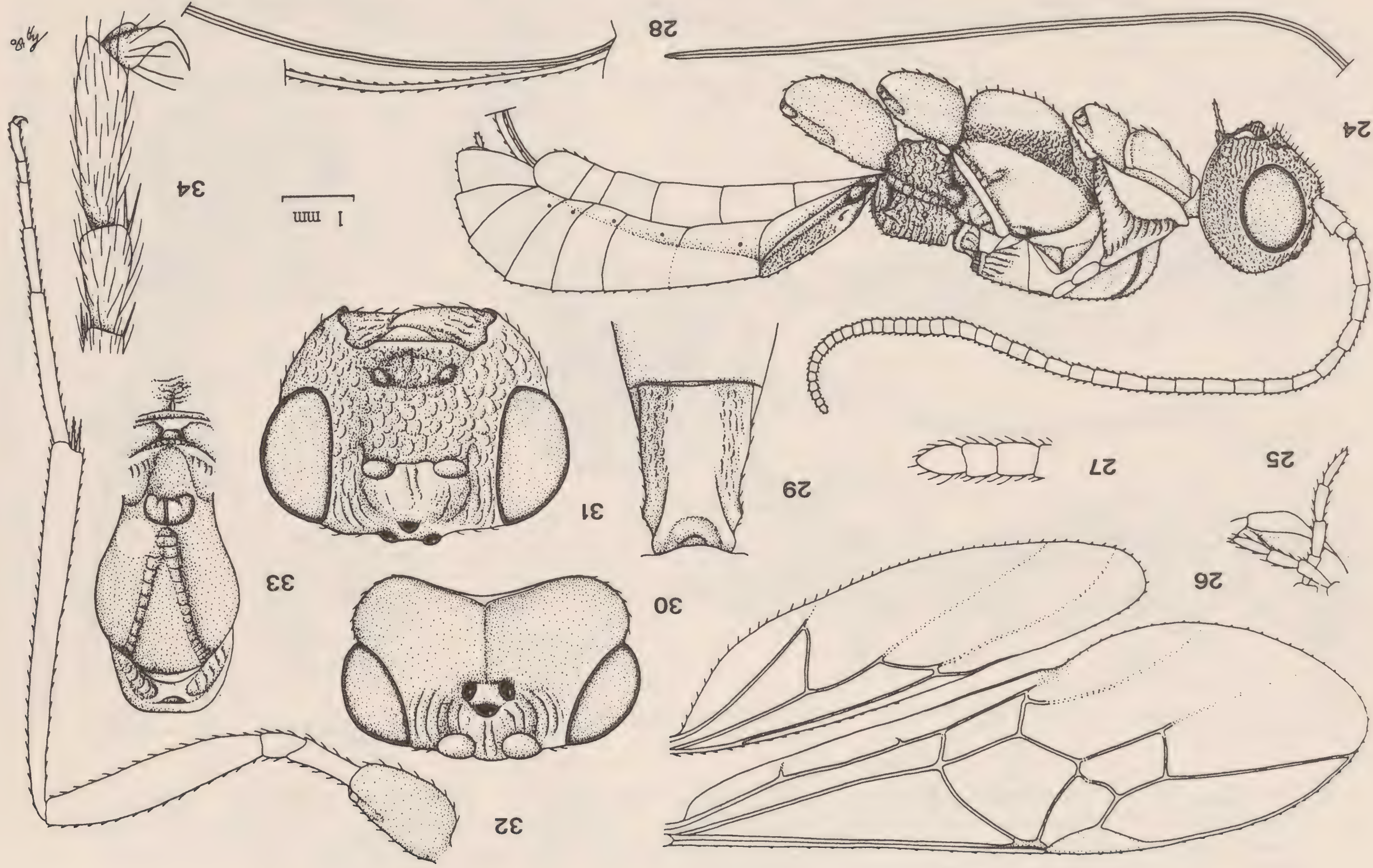
Figs. 2-7. *Parabrulleia euphemia* (Turner) [= *P. shibuensis* (Matsumura)], holotype: 2, Habitus. 3, Wings. 4, Ovipositor. 5, Outer hind spur. 6, Head, frontal aspect. 7, Inner hind claw. 1-4: scale-line (=1x); 5: 5x; 6: 2x; 7: 4.2x.



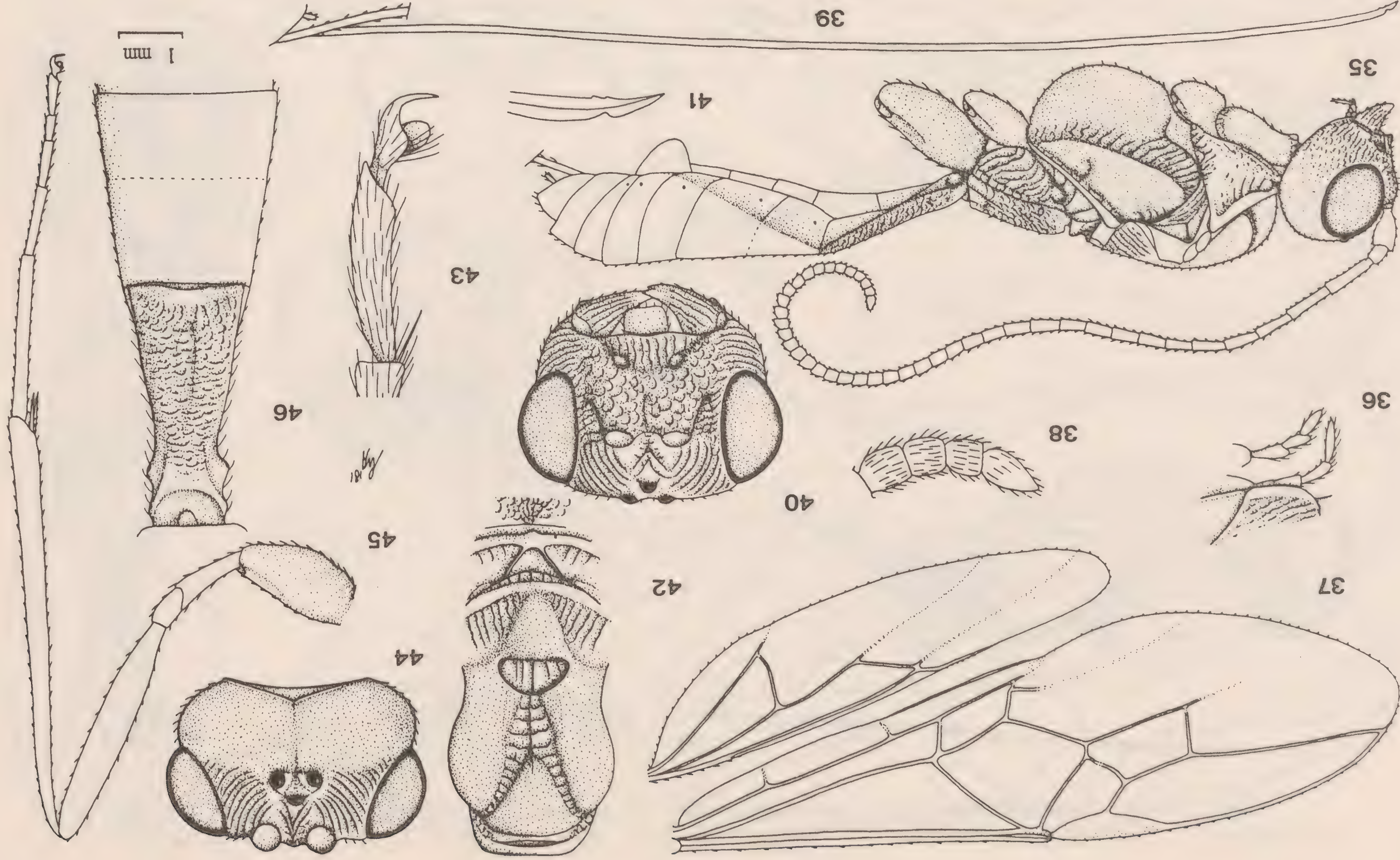
Figs. 8-14. *Parabrulleia euphemia* (Turner) [= *P. shibuensis* (Matsumura)], holotype: 8, Palpi. 9, Head, dorsal aspect. 10, Antenna. 11, Fore tibia and basitarsus. 12, 1st and 2nd tergites, dorsal aspect. 13, Mesosoma, dorsal aspect. 14, Hind leg. 8: 4.2x; 9, 12, 13: 1.7 x; 10, 11, 14: Scale-line (=1x).



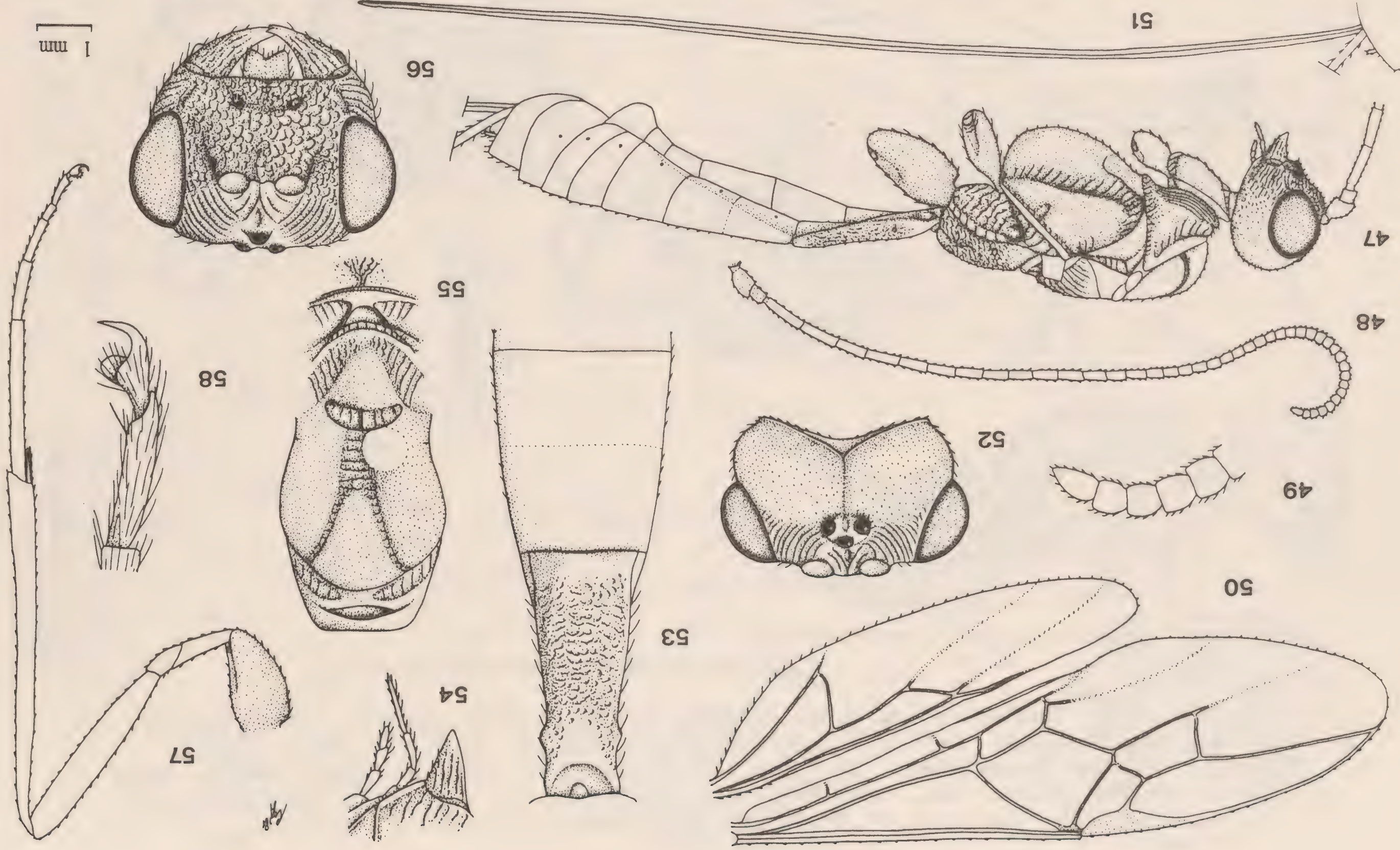
Figs. 15-23. *Brulleia nipponensis*, n. sp., holotype: 15, Habitus. 16, Antenna. 17, Wings. 18, Apex of antenna. 19, Ovipositor sheath. 20, Palpi. 21, Head, dorsal aspect. 22, Head, frontal aspect. 23, Mesosoma, dorsal aspect. 15-17, 19: scale-line (+ 1x); 18: 5x; 20: 3.3 x; 21-23: 2x.



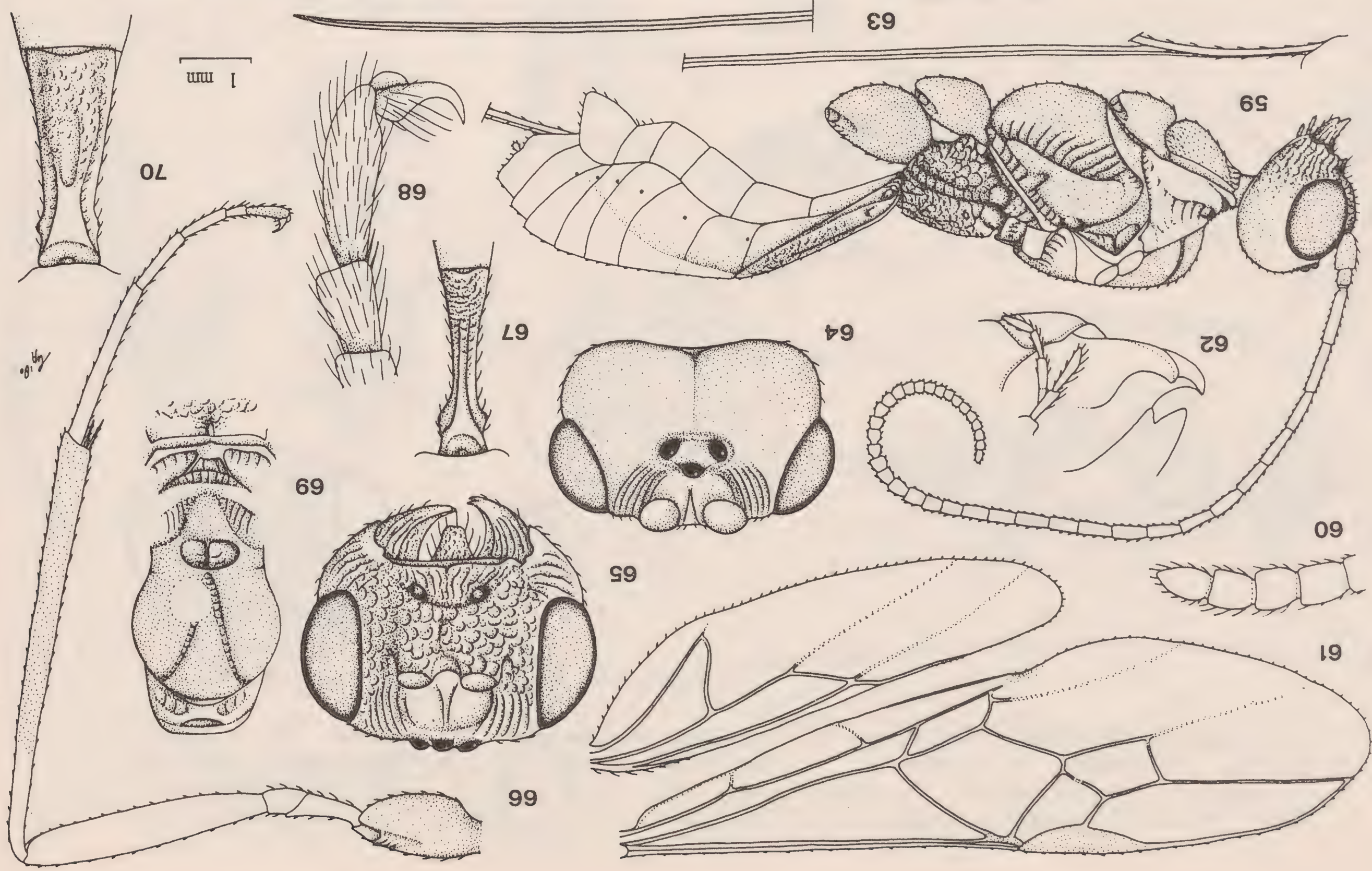
Figs. 24-34. *Brulleia townesi*, n. sp., Holotype: 24, Habitus. 25, Palpi. 26, Wings. 27, Apex of antenna. 19, Ovipositor sheath. 20, Palpi. 21, Head, dorsal aspect. 22, Head, frontal aspect.



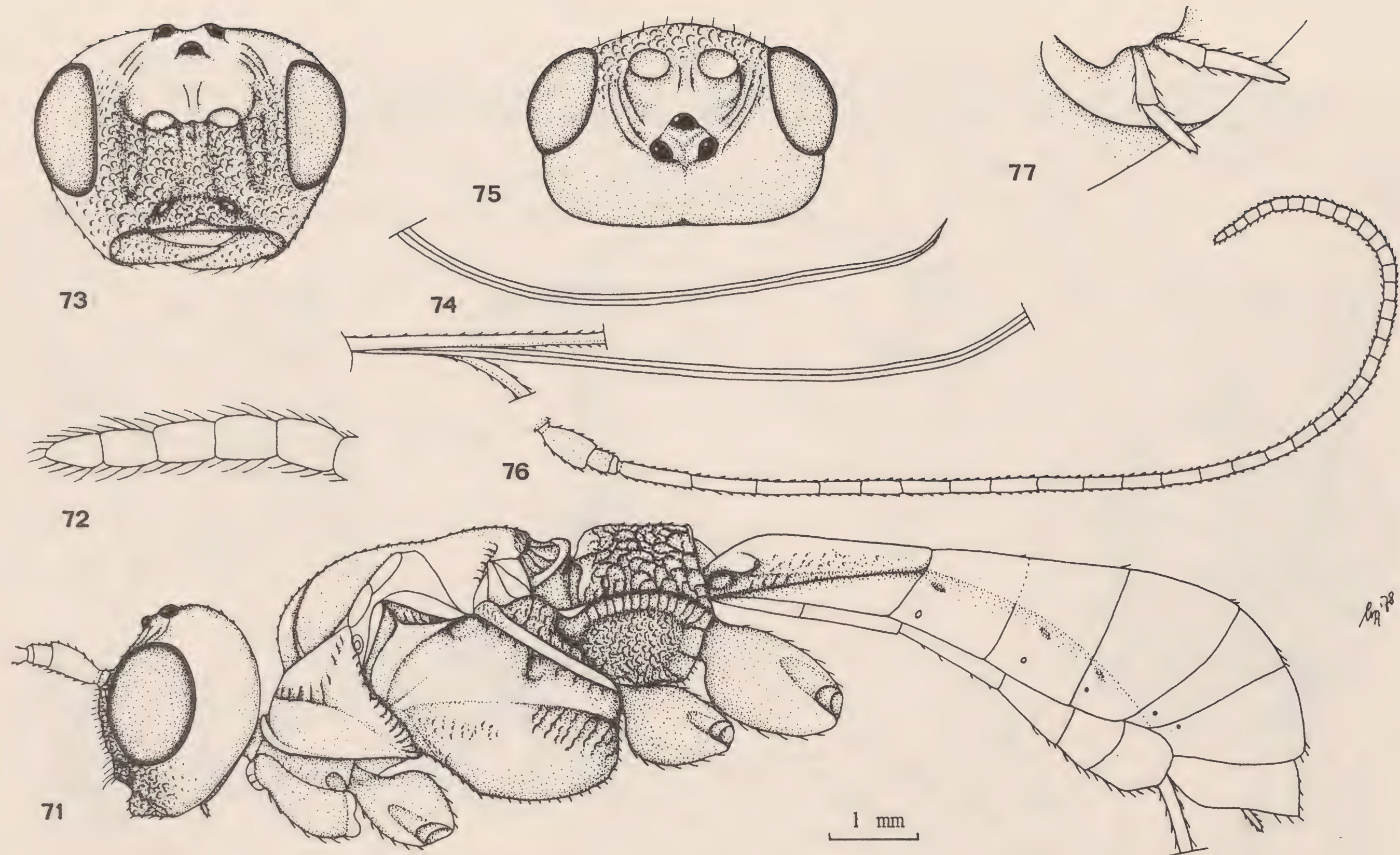
Figs. 35-46. *Brulleia brunnea*, n. sp., holotype: 35, Habitus. 36, Palpi. 37, Wings. 38, Apex of antenna. 39, Ovipositor. 40, Head, frontal aspect. 41, Apex of ovipositor. 42, Mesosoma, dorsal aspect. 43, Outer hind claw. 44, Head, dorsal aspect. 45, Hind leg. 46, 1st-3rd tergites, dorsal aspect. 35,37,39,45: scale-line (1x); 36: 2x; 38, 41, 43: 5x; 40, 44: 2x; 42, 46: 1.5 x.



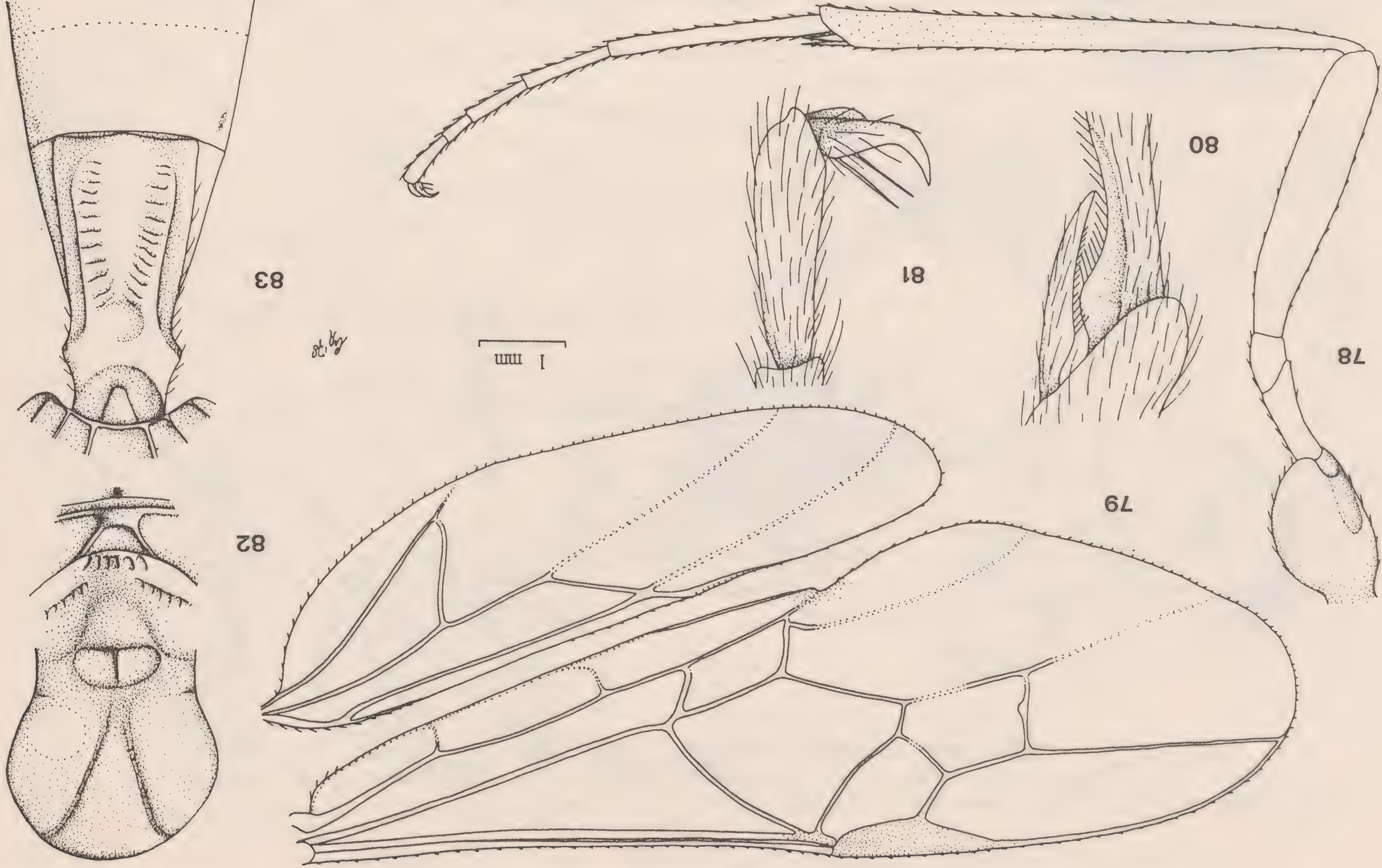
Figs. 47-58. *Brulleia nigra*, n. sp., holotype: 47, Habitus. 48, Antenna. 49, Apex of antenna. 50, Wings. 51, Ovipositor. 52, Head, dorsal aspect. 53, 1st-3rd tergites. 54, Palpi. 55, Mesosoma, dorsal aspect. 56, Head, frontal aspect. 57, Hind leg. 58, Outer hind claw. 47, 48, 50, 51, 57: scale-line (=1x); 49, 58: 5x; 52: 2x; 53: 1.6x; 54: 3x.



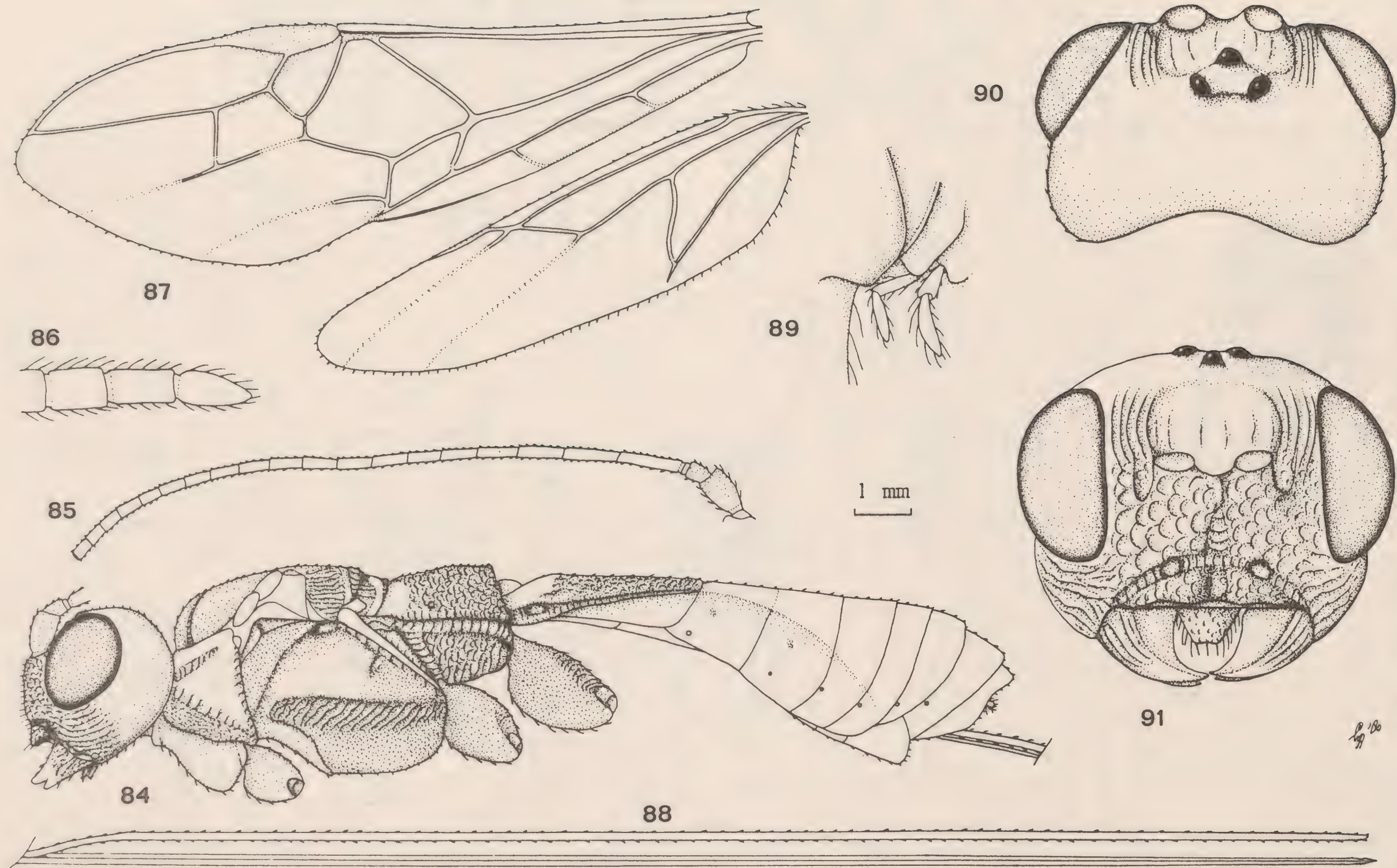
Figs. 59-70. *Brulleia tricolor*, n. sp., holotype (but 66 of female paratype, and 67 of male paratype from Canlaon): 59, Habitus. 60, Apex of antenna. 61, Wings. 62, Palpi. 63, Ovi-positor. 64, Head, dorsal aspect. 65, Head, frontal aspect. 66, Hind leg. 67, 1st tergite, dorsal aspect. 68, Inner middle claw. 69, Mesosoma, dorsal aspect. 70, 1st tergite, dorsal aspect. 59, 61, 63, 66: scale-line (=1x); 60, 68: 5x; 62: 3.2 x; 64, 65: 1.6 x; 67, 69, 70: 1.3 x.



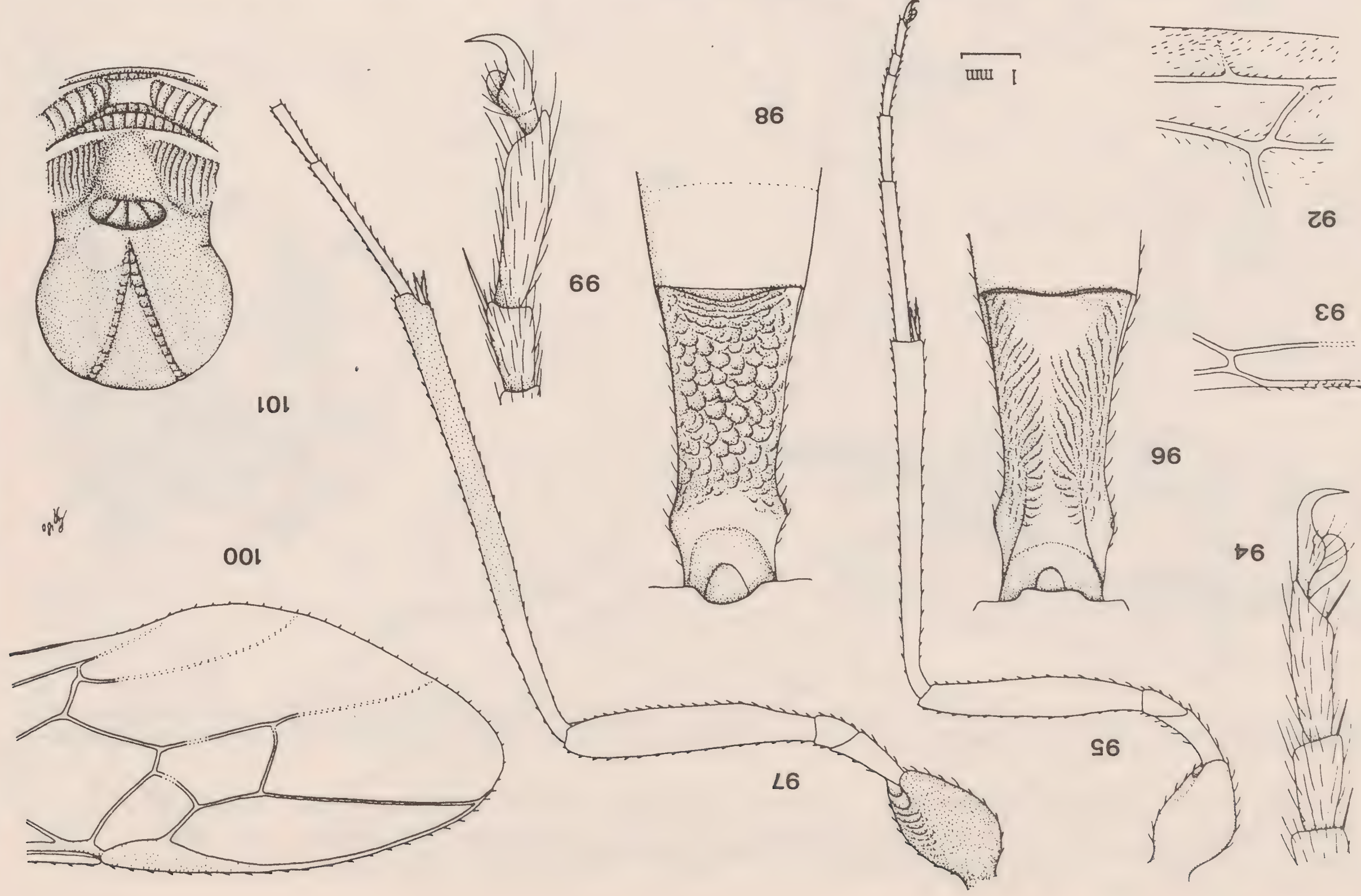
Figs. 71-77. *Brulleia melanocephala* Szépligeti, holotype: 71, Habitus. 72, Apex of antenna. 73, Head, frontal aspect. 74, Ovipositor. 75, Head, dorsal aspect. 76, Antenna. 77, Palpi. 71, 74, 76: scale-line (=1x); 72: 5x; 73, 75: 1.1x; 77: 3.3x.



Figs. 78-83. *Brulleia melanocephala* Szépligeti, holotype: 78, Hind leg. 79, Wings. 80, Fore tibial spur. 81, Inner hind claw. 82, Mesosoma, dorsal aspect (partly). 83, 1st and 2nd tergites, dorsal aspect. 78, 79: scale-line (= 1x); 80, 81: 5x; 82, 83: 1.1 x.



Figs. 84-91. *Brulleia latiannulata* (Cameron), holotype (but 86 of female from Papua New Guinea, Gent River): 84, Habitus. 85, Antenna. 86, Apex of antenna. 87, Wings. 88, Ovipositor. 89, Palpi. 90, Head, dorsal aspect. 91, Head, frontal aspect. 84, 85, 87, 88: scale-line (=1x); 86: 5x; 89: 3.5x; 90, 91: 1.7x.



Figs. 92-96. *Brulleia nipensis*, n. sp., holotype: 92, Apex of subbasal cell of fore wing. 93, detail of vein SC + R1 of hind wing. 94, Outer hind claw. 95, Hind leg. 96, 1st tergite, dorsal aspect. Figs. 97-99, 101, *Brulleia latianulata* (Cameron), holotype: 97, Hind leg. 98, 1st and 2nd tergites, dorsal aspect. 99, Outer hind claw. 101, Mesosoma, dorsal aspect (partly). Fig. 100, *Parabrulleia chinensis* (Turner) [= *P. shibuenis* (Matsumura)], holotype, apex of fore wing. 92, 93, 96, 98, 101: 2x; 94, 99: 5x; 95, 97, 100: scale-line (=1x).